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Roughages for Fattening Two-Year-Old Steers

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CONTENTS

SUMMARY

1. In the winter fattening of two year old steers, during a four months feeding period, corn silage, alfalfa hay and clover hay, when fed in conjunction with a full allowance of shelled corn and salt, with limited cottonseed meal, proved to be, as in other experiments conducted at this station, superior roughages. A ton of corn silage had a feeding value of approximately two-fifths to one-half that of a ton of alfalfa or clover hay. This corn silage represented from 7½ to 7 4/5 field bushels of "14 percent moisture" corn grain, per ton as fed.

2. Mixed timothy—clover hay, similarly fed, was not so valuable as the straight leguminous roughages, alfalfa and clover hay, being worth approximately half as much per ton as the legumes.

3. Corn fodder when used to replace the corn silage or the legume hays during the entire feeding period gave relatively poor results. The corn fodder substitution resulted in slower gains, a lessened selling price of from 50 to 75 cents per hundred and a decreased margin per steer.

4. A timothy-oat straw roughage combination fed in the ratio of 19:1 showed up unsatisfactorily as compared to straight clover hay. This combination of fibrous feeds decreased the gains .48 pound per steer daily, increased the cost per hundred pounds of gain $2.71 and lessened the selling price 35 cents the hundred. The margins per steer over feed costs were less than half those on red clover, the feeds being charged as follows: clover $16, timothy $18 and oat straw at $10 the ton. The timothy-oat straw combination was very inefficient even tho 3 pounds of cottonseed meal were allowed daily per steer in conjunction with a full feed of corn grain and salt.

5. The feeding of a full allowance of corn silage and salt and a limited allowance of cottonseed meal, 3 pounds per steer daily, and alfalfa hay was not as profitable in this work as a full allowance of dry shelled corn fed in addition. The cattle full-fed the dry shelled corn outsold the others 65 cents the hundredweight and returned a much more favorable margin per steer over feed costs. In years of relatively cheap corn when the dry matter in the corn silage costs practically as much as in the corn grain the limitation of the corn grain for cattle such as those used is doubtful, particularly since the heavy grained cattle sell for more per hundredweight, 65 cents in this experiment.

6. In predicting the financial outcome from the winter feeding of two-year-old steers on rations such as those reported on herein, it is essential that the feeder refigure feed costs and steer margins on the basis of ocal conditions. When the relative prices of feeds and steers change, new profit or loss alignments are inevitable.

Roughages for Fattening Two-Year-Old Steers

By John M. Evvard, C. C. Culbertson, Q. W. Wallace and W. E. Hammond

The relative values of different roughages in the winter fattening of two-year-old steers when shelled corn, full-fed, cottonseed meal and salt are allowed, as well as the advisability of limiting the grain fed in a corn silage-alfalfa hay-salt ration. are the themes of the experiment covered in this bulletin.

How does corn fodder compare in feeding value with corn silage? What are the comparative feeding values of red clover and alfalfa hays? Will timothy and oat straw supply the steers' needs economically when this roughage is balanced with a liberal allowance of cottonseed meal fed with the corn grain and salt? How does mixed timothy-clover hay rank alongside the pure red clover? Can one finish two-year-old cattle with profit by using corn silage, alfalfa hay and salt without extra grain? These are some of the questions this research throws light upon.

Objects of the Experiment 1921-1922

1. To compare the use of different roughages—corn silage, corn fodder, alfalfa hay, red clover hay, mixed timothy-clover hay and timothy hay—in fattening cattle in the Corn Belt.

2. To work out practical figures showing the relative economy of a standard corn belt ration, having corn silage and alfalfa hay for roughages, as compared to a somewhat similar ration, altered by leaving out corn silage, or the corn grain.

3. To test out the practicability in the Corn Belt of a "no grain" ration, when much silage and some alfalfa hay are the roughages used.

4. To note how the different rations fed affected the finish, market value and shrinkage of cattle (enroute to market).

5. To note how the various feeds used alter the production of gains on the hogs following.

6. To study particularly the influence of the different rations upon the feed consumption, gains of the cattle, the feed requirements, the finish, the market value, the shrinkage in shipping and the yield and character of the carcasses.

Bulletin 182, October, 1918, entitled 'Limiting the Grain Ration for Fattening Cattle,' is still available for distribution. This bulletin gives two years' results in feeding various limited vs. full corn grain rations to two-year-old steers receiving linseed oilmeal, corn silage, alfalfa hay and salt. The study of corn grain allowance presented in this paper is a continuation of that limited grain feeding work.

METHODS OF EXPERIMENTATION

I. Duration of Experiment

The experiment started December 10, 1921, and continued until April 9, 1922, a period of 120 days.

II. Animals Used—Steers

Sixty-eight two-year-old steers, showing a preponderance of Shorthorn blood, were purchased on the Kansas City market October 12, 1921, having been selected from several carloads. These steers, presumably, all came from Western Kansas. They graded on the market as good Shorthorn dehorned feeding steers. They averaged about 1,047 pounds per head at Kansas City. The average purchase price in the stockyards was $5.25 per hundredweight.

After the steers arrived in Ames they were run on pasture with no other feeds except salt. Forty-nine of the 68 steers, seven lots of seven steers each, were started on experiment. Nineteen of the poorest ones were culled out. The condition of the steers when they started on experiment ranged from fair to medium on the basis of the following grades being used: prime, choice, good, medium, fair, common and inferior. They were figured to cost in the feed lots on December 10, 1921, $5.46 per hundredweight.

III. Animals Used—Hogs Following

The hogs which followed the steers were Poland Chinas, Poland China-Hampshires and Poland China-Tamworths. They were all raised on the station farm. Previous to this experiment all were run together on alfalfa and rape pastures and received shelled corn, meat meal tankage, corn oil cake meal and block salt. The pigs weighed approximately 194 pounds and were from medium to good in condition at the time the experiment started.

Twenty-four hogs were used in the experiment, three hogs following each of the seven groups of steers with three hogs constituting a check group VIII. In alloting the hogs, the distribution, as regards the breeding, color, condition, age in days, and individual weights, was made so as to have the eight lots as uniform as possible.

The check group of hogs was self-fed free-choice style on shelled corn, meat meal tankage and block salt. This check group was used to determine the feed required for 100 pounds gain. The check group hogs showed how much corn and tankage (both self-fed) were required by a group of hogs similar to the group following the steers. This check group was fed in a dry lot, smaller than the steer yards, adjacent to the steer lots.

Using the feed requirement figures of the check lot, and knowing how much corn and tankage (hand fed, limited) were required for a similar lot following steers to make 100 pounds gain, it is easy to calculate by subtraction the amount of grain or feed equivalent rescued or saved from the droppings by the hogs, this saving being in terms of corn and tankage equivalent.

IV. Allotment Considerations

The 49 steers used were divided uniformly into seven groups. Care was taken not only to have the total initial weights of all groups approximately equal, but also to have the variations from the average weights, within groups, similarly distributed. Due consideration was also given in allotment to the condition, prospective outcome, breeding, color and measurements (height at withers, height at rump, heart girth and paunch girth) of the individual steers so as to secure practically equal apportionment among the several groups.

V. Housing and Yards

The animals on the experiment were housed in a long experimental feeding shed which faced the south. The floor of this shed was concrete for all lots excepting VII. Each lot of cattle had an inside "lying down" floor space of approximately 19x20 feet. The inside floor of Lot VII had a solid, dry dirt base.

There was an 8-foot doorway in each 20-foot section of the shed, the lot spaces inside being separated by open wooden partitions; the shed was practically open from end to end, thus insuring uniform ventilation and temperature in all lots. A manger or bunk in which the silage and hay were fed ran the length of all sections inside the shed, on the north side. In this was fed the rough feed. In each section of the shed on the south wall a salt block was placed in a box to which the steers had access at all times. The southeast corner of each section was fenced off so as to provide a place where the pigs were fed and where they might lie down, protected from the steers.

The outside unpaved yard for each lot was approximately 20x66 feet. The sides were boarded up to a height of about 5 feet so that all yards were well protected from the wind. In about the middle of each yard was a feed bunk about 11½ feet long by 2½ feet wide by 7 inches deep where the grain for all lots was fed. Besides this there were large round concrete water tanks in the yards for the steers.

VI. Weights of Animals on Experiment

Individual weights were taken on the steers for three consecutive days at the beginning and at the close of the experi-

ment. At the end of 30, 60 and 90 days, weights were taken for three consecutive days, those on the first and third days being by group, those on the second day being taken individually. All weights, on both the cattle and the hogs, were taken between 9 and 12 a. m.

The hogs following the steers were weighed three times as individuals at the beginning of the experiment, once as individuals at the end of each 30 days and three times as individuals at the close of the experiment. The check lot was weighed in a similar manner.

VII. Rations Fed and Methods of Feeding

The seven lots of cattle were fed the following rations:

Lot I—Silage—Alfalfa Ration (Check). Shelled corn hand-full-fed twice daily; plus cottonseed meal, 3 pounds per head daily given in two feeds on shelled corn; plus corn silage hand-full-fed twice daily; plus alfalfa hay self-fed; plus block salt self-fed. This ration is a tried and proven standard Iowa check ration.

Lot II—No Grain-Silage-Alfalfa Ration. Cottonseed meal, 3 pounds per head daily given in two equal feeds on the silage; plus corn silage hand-full-fed twice daily; plus alfalfa hay self-fed; plus block salt self-fed.

Lot III—Corn Fodder. Shelled corn hand-full-fed twice daily; plus cottonseed meal, 3 pounds per head daily given in two feeds on shelled corn; plus edible corn fodder self-fed; plus block salt self-fed.

Lot IV—Alfalfa Hay. Shelled corn hand-full-fed twice daily; plus cottonseed meal, 2 pounds per head daily given in two feeds on shelled corn; plus alfalfa hay self-fed; plus block salt self-fed.

Lot V—Red Clover Hay. Shelled corn hand-full-fed twice daily; plus cottonseed meal, 2 pounds per head daily given in two feeds on shelled corn; plus red clover hay self-fed; plus block salt self-fed.

Lot VI—Mixed Timothy-Red Clover Hay. Shelled corn hand-full-fed twice daily; plus cottonseed meal, 2½ pounds per head daily given in two feeds on shelled corn; plus mixed timothy-red clover hay self-fed; plus block salt self-fed.

Lot VII—Timothy Hay and Oat Straw. Shelled corn hand-full-fed twice daily; plus cottonseed meal, 3 pounds per head daily given in two feeds on shelled corn; plus timothy hay self-fed; plus oat straw self-fed; plus block salt self-fed.

The steers in all lots were hand-fed twice daily, about seven a. m. and four p. m. The roughages were fed first in all lots. Silage in Lots I and II was fed first, then the hay. The shelled corn with the cottonseed meal on it was fed after the roughages

except in Lot II where the cottonseed meal was fed with the silage, no corn grain being fed this lot. The dry roughages were self-fed in all lots, and the corn silage was hand-full-fed in Lots I and II. The shelled corn was hand-full-fed, care being taken to get the steers on full feed as soon as possible. They arrived at a full feed in about three weeks to a month. The full allowance of cottonseed meal was fed from the start. Each lot was a law unto itself as regards feed consumption and hence was pushed along on feed as fast as possible regardless of how the other lots took to their feed.

All lots were watered in large open concrete tanks, the object being to keep water before the steers all the time. During freezing weather the ice was broken twice daily, more often if necessary.

The pigs following the steers were hand-fed twice daily. Shelled corn was allowed in limited amounts, being so regulated that the pigs were indirectly stimulated to consume as much corn as possible from the trough and still clean up the corn from the steers' droppings. The amounts fed the several lots differed, depending upon how far the steers' droppings went toward satisfying the pigs' appetites. The corn allowance was divided into two feeds daily; with the evening portion a fifth of a pound of meat meal tankage per head was mixed. The check lot of pigs, not following cattle, had access at all times to self-feeders containing shelled corn, meat meal tankage and block salt.

VIII. Feeds Used

A description of the various feeds follows:

Shelled Corn: The shelled corn of mixed color, used for both steers and hogs, was of the current crop. A moisture determination was made on a composite sample from each month's supply. The following moisture percentages were found:

First 30 days	16.03
Second 30 days	15.43
Third 30 days	16.50
Fourth 30 days	16.61
Average straight for the 120 days	16.14

In all the tables which follow the mixed shelled corn is figured on a No. 2, 14 percent moisture basis, this being done with corn in all our experimental feeding work so as to make the results, one year with another, comparable.

Cottonseed Meal: This was an acceptably high protein cottonseed meal furnished by the American Cotton Oil Company of New York. The guaranteed analysis was as follows:

Protein (not less than)	41.18 percent
Fat (not less than)	8.00 percent
Carbohydrates (not less than)	26.00 percent
Fiber (not more than)	10.00 percent

Meat Meal Tankage: Cudahy's Blue Ribbon meat meal tankage was used, this being a regular 60 percent protein tankage.

Corn Silage: The silage fed from Dec. 10 to March 20 was made from the current corn crop, the variety being Reid's yellow dent. The yield of silage per acre was 10.32 tons. The yield of corn grain per acre on the shelled corn (14 percent moisture) basis was 77.03 bushels. The average ton of silage therefore represents 7.46 bushels of 14 percent moisture shelled corn. The silage fed from March 20 to the end of the experiment was made from corn of the current crop but grown in another field. The yield of silage per acre was approximately 4.95 tons. The yield of corn grain per acre on the shelled corn (14 percent moisture) basis was 38.53 bushels. The average ton of silage, therefore, represented approximately 7.78 bushels of 14 percent moisture shelled corn.

Corn Fodder: The corn fodder fed was of the current crop. The fodder was well dried out when fed. It yielded 1.83 tons per acre. The yield of corn grain per ton of fodder was 20.7 bushels of (14 percent moisture) shelled corn; this is equivalent to 1159.2 pounds to the ton, or 57.96 percent of the fodder's weight.

Alfalfa Hay: This was Nebraska grown hay and was probably of the second cutting. It was a little coarse, lacking somewhat in leaves, but was a pure alfalfa. The alfalfa hay grade was considered No. 1.

Red Clover Hay: This hay was grown in northern Iowa. It was a straight clover of very good farm quality and would have graded as a No. 1 clover hay.

Mixed Timothy-Red Clover Hay: This was northern Iowa grown hay. It was one-half to two-thirds timothy, the balance being red clover. It was a very good mixed hay of good farm quality and would have graded as No. 1 red clover mixed.

Timothy Hay: This was an Iowa grown timothy hay. It was a very good pure timothy hay and would have graded as choice timothy hay.

Oat Straw: This was a good grade of bright well-threshed oat-straw, grown near Ames. We would estimate this straw to run approximately 3.5 percent protein and 36 percent fiber.

Salt: Block salt was secured from the Morton Salt Co., Chicago, Ill. The company stated that it carried from 98.5 to 99.5 percent sodium chloride and was "exactly the same salt as we pack for our table salt trade." It came in 50-lb. blocks

IX. Chemical Composition of Feeds Used

Table I shows the actual analysis of the feeds used as reported by W. G. Gaessler, A. R. Lamb and J. A. Schulz of the Chemistry Section of the Iowa Agricultural Experiment Sta-

TABLE I. CHEMICAL COMPOSITION OF FEEDS USED
(Analyses by W. G. Gaessler, A. R. Lamb and J. A. Schulz)

	Water	Dry matter	Total crude protein	Carbohydrates		Fat or ether extract	Mineral matter or ash
				N-free extract	Crude fiber		
Shelled corn	14.00	86.00	8.51	70.25	2.45	3.67	1.12
Cottonseed meal	5.28	94.72	42.92	28.84	8.30	8.28	6.38
*Corn silage	65.69	34.31	2.86	22.04	6.09	1.53	1.80
**Corn silage	63.17	36.83	2.94	22.14	8.54	1.21	2.00
Corn fodder	6.88	93.12	5.74	57.06	24.65	2.10	3.56
Alfalfa hay	5.21	94.79	10.54	34.59	39.21	1.54	8.91
Clover hay	6.80	93.20	10.33	39.45	34.72	2.82	5.88
Mixed hay	5.33	94.67	7.71	43.73	35.17	2.29	5.77
Timothy hay	6.45	93.55	4.95	48.33	33.00	2.40	4.87
Oat straw	See description						
Block salt	See description						
Cudahy's tankage	7.23	92.77	66.90	2.25	4.65	9.41	9.56
***Corn silage	72.25	27.75	2.80	16.31	5.61	1.00	2.03

*Analysis of silage fed from Dec. 10, 1921, to Jan. 1, 1922.
**Analysis of silage fed from Jan. 1, to Mar. 20, 1922.
***Analysis of silage fed from March 20 to close of experiment.

tion. The shelled corn composition is refigured to have it conform to the water and dry matter basis, as charged to the cattle, i.e. a 14 percent moisture content. The other feeds are all reported on the natural feeding basis, representing the feeds as fed and charged.

The prices of feeds used in computing the financial results of this experiment represent the actual Ames market prices during the four months that this experiment was in progress.

It is obvious that these prices will not be applicable under any other conditions or in another locality. The reader may, by applying his own prices to the feeds in question, estimate feed costs for his own local conditions. He can also estimate the initial cost of steers and, if he is feeding and handling in a like manner, two-year-old steers similar to those used and fed in this test, he can make his own computations

RESULTS OF THE EXPERIMENT

Basic Considerations

The experiment herein reported was conducted in order to add to our knowledge of the relative value of various cornbelt roughages in the ration of two-year-old steers. The roughages —alfalfa hay, red clover hay, corn fodder, mixed timothy-red clover hay and timothy hay—were compared not only to the standard corn belt ration containing corn silage and alflafa hay, but likewise each ration may be compared to every other ration for interpretative purposes. A careful relative study of the data given will be highly instructive in determining proportionate roughage values as well as the advisability or

TABLE II. ROUGHAGES FOR FATTENING TWO-YEAR-OLD STEERS

Fattening two-year-old steers, Dec. 10, 1921, to April 9, 1922, seven 1100-pound steers in a group. Three hogs following. Figures on single average steer basis. All figures in pounds unless otherwise designated.

Lot No.	I Corn silage—alfalfa hay	II No-grain ration silage—alfalfa hay	III Corn fodder	IV Alfalfa hay	V Red clover hay	VI Mixed hay	VII Timothy hay—Oat straw
Average initial weight	1113.9	1114.8	1117.7	1126.5	1120.0	1117.0	1107.0
Average final weight	1430.0	1347.4	1353.3	1412.0	1417.1	1390.0	1345.8
Average daily gain	2.64	1.94	1.96	2.38	2.47	2.28	1.99
Initial cost per cwt. in feed lot	$5.46	$5.46	$5.46	$5.46	$5.46	$5.46	$5.46
Average daily feed consumed:							
Shelled Corn	18.0	.....	16.3	20.3	20.3	21.0	20.0
Cottonseed meal	3.0	3.0	3.0	2.0	2.0	2.5	3.0
Corn silage	23.6	55.0	.....	.....	.....	.....	.....
Corn fodder	.....	.....	8.4*	.....	.....	.....	.....
Alfalfa hay	3.0	4.0	.....	9.6	.....	.....	.....
Clover hay	.....	.....	.....	.....	8.7	.....	.....
Mixed hay	.....	.....	.....	.....	.....	8.5	.....
Timothy hay	.....	.....	.....	.....	.....	.....	6.0
Oat straw	.....	.....	.....	.....	.....	.....	.3
Block salt	.01	.01	.03	.01	.03	.02	.01
Feed required for 100 pounds gain:							
Shelled corn	681.7	.....	828.4	852.6	822.0	924.6	1002.3
Cottonseed meal	113.8	154.8	152.8	84.1	80.9	109.9	150.7
Corn silage	895.5	2838.3	.....	.....	.....	.....	.....
Corn fodder	.....	.....	429.4*	.....	.....	.....	.....
Alfalfa hay	113.7	208.4	.....	402.5	.....	.....	.....
Clover hay	.....	.....	.....	.....	353.5	.....	.....
Mixed hay	.....	.....	.....	.....	.....	.....	.....
Timothy hay	.....	.....	.....	.....	.....	371.7	299.3
Oat straw	.....	.....	.....	.....	.....	.....	15.7
Block salt	.40	.64	1.32	.39	1.09	.91	.59
Cost of feed for 100 pounds gain excluding hogs	$11.11	$13.32	$12.67	$12.13	$10.65	$12.47	$13.45
Feed saved per 100 pounds gain on steers by hogs:							
Shelled corn	75.0	—19.3	64.9	79.5	56.6	83.9	66.6
Meat meal tankage	3.0	3.0	2.2	3.1	1.9	3.3	2.2
Net cost of 100 pounds gain on steers:							
Crediting feed saved by hogs	$10.47	$13.37	$12.13	$11.45	$10.18	$11.74	$12.89
Crediting hog gains at $9.00	$ 9.32	$12.02	$10.99	$10.21	$ 9.22	$10.45	$11.71
Necessary Ames selling price on steers per cwt. to break even:							

Excluding hogs	$6.71	$6.82	$6.72	$6.81	$6.55	$6.84	$6.88
Crediting feed saved by hogs	$6.57	$6.83	$6.62	$6.67	$6.45	$6.69	$6.78
Crediting hog gains at $9.00	$6.31	$6.59	$6.42	$6.42	$6.25	$6.44	$6.57
Actual Chicago selling price on steers per cwt.	$8.50	$7.85	$7.76	$8.25	$8.25	$8.15	$7.90
Net returns on steers, Ames, per cwt. in feed lots—							
Home weights	$7.63	$6.78	$6.92	$7.38	$7.39	$7.32	$7.09
Margin per steer over feed cost							
Excluding hogs	$13.09	$—0.46	$2.76	$8.08	$12.00	$6.76	$2.81
Crediting feed saved by hogs	$15.13	$—0.67	$4.05	$10.03	$13.41	$8.73	$4.15
Crediting hog gains at $9.00	$18.76	$2.57	$6.73	$13.56	$16.25	$12.27	$6.98

*Represent edible portion, or 76.93 percent of total amount offered.

inadvisability of feeding corn grain with corn silage, alfalfa hay, cottonseed meal and salt.

Summarized Data

Figures are given in table II summarizing the weights, gains, feeding and financial data of the experiment on a 120-day or total feeding period basis. Table XXII, supplementary to table II but giving the results by monthly periods, will be found in the appendix. This detailed table gives the original, total and average weights per steer, total and average daily gains per steer and total feed charged to all steers. These data cover the entire experiment.

Average Daily Feed Per Steer

The total amount of concentrates consumed per steer daily varied but little in the comparable lots, I, III, IV, V, VI and VII. The greatest concentrate consumption is noted in Lot VI, 23.5 pounds per steer, while the lowest consumption was in Lot III, 19.3 pounds. The steers in Lot II were fed no grain except that normally in the corn silage and were limited to three pounds of cottonseed meal per head daily.

The steers in the "No Grain-Silage-Alfalfa" fed lot, II, consumed 55 pounds of corn silage as compared to 23.6 pounds in Lot I, which was full fed on shelled corn. The steers in Lot I consumed 3 pounds of alfalfa hay as compared to 4 pounds in Lot II. The roughage consumption in the other lots varied from 9.6 pounds of alfalfa hay in Lot IV to 6.3 pounds of the combined timothy hay and oat straw, only .3 of which was oat straw, in Lot VII.

The total daily feed consumption was greatest in the lots receiving corn silage, Lots II and I consuming 62 pounds and 47.6 pounds of feed, respectively. The total daily feed consumption in the other lots varied from 27.7 pounds in lot III to 32 pounds in Lot VI. The high feed con-

TABLE III. AVERAGE DAILY FEED CONSUMED PER STEER BY 30-DAY PERIODS (POUNDS)

	Dec. 10, 1921, to Jan. 9, 1922	Jan. 9, 1922, to Feb. 8, 1922	Feb. 8, 1922, to Mar. 10, 1922	Mar. 10, 1922, to Apr. 9, 1922	Dec. 10, 1922, to Apr. 9, 1922
Lot I					
Shelled corn	11.8	19.0	19.8	21.3	18.0
Cottonseed meal	3.0	3.0	3.0	3.0	3.0
Corn silage	33.7	23.0	21.0	16.7	23.6
Alfalfa hay	3.5	2.8	3.0	2.7	3.0
Block salt	.01	.01	.02	.01	.01
Lot II					
Cottonseed meal	3.0	3.0	3.0	3.0	3.0
Corn silage	51.8	54.9	55.7	57.7	55.0
Alfalfa hay	4.6	4.0	4.1	3.5	4.0
Block Salt	.01	.01	.01	.02	.01
Lot III					
Shelled corn	11.8	16.3	18.0	19.0	16.3
Cottonseed meal	3.0	3.0	3.0	3.0	3.0
Corn fodder*	11.7	7.6	8.1	6.3	8.4
Block salt	.02	.03	.03	.03	.03
Lot IV					
Shelled corn	13.0	20.4	23.6	24.0	20.3
Cottonseed meal	2.0	2.0	2.0	2.0	2.0
Alfalfa hay	15.2	7.5	8.4	7.3	9.6
Block salt	.01	.02	.01	.01	.01
Lot V					
Shelled corn	13.0	21.7	23.2	23.3	20.3
Cottonseed meal	2.0	2.0	2.0	2.0	2.0
Clover hay	13.9	6.6	8.4	6.1	8.7
Block salt	.03	.02	.03	.03	.03
Lot VI					
Shelled corn	13.0	23.0	23.6	24.5	21.0
Cottonseed meal	2.5	2.5	2.5	2.5	2.5
Mixed hay	14.1	7.1	6.7	5.9	8.5
Block salt	.01	.03	.02	.02	.02
Lot VII					
Shelled corn	13.0	21.3	23.0	22.4	20.0
Cottonseed meal	3.0	3.0	3.0	3.0	3.0
Timothy hay	10.6	4.8	4.7	3.7	6.0
Oat straw	.7	.1	.1	.3	.3
Block salt	.01	.01	.01	.01	.01

*Represents edible portion.

sumption of Lots I and II is accounted for in part by the fact that these two lots received corn silage containing a high percentage of moisture. The handling of this extra weight of feed has significance in determining the labor costs.

Table III gives the average daily feed consumption per steer by 30 day periods. This table is useful for future figuring, study and handy reference. It shows how the feed was distributed thruout the periods.

Daily Crude Protein and Dry Matter Consumption

The figures showing the average daily crude protein and average daily dry matter consumption per steer are well worth studying. These figures are presented in table IV.

The figures show that the four lots (I, IV, V and VI) that made the greatest daily gains also consumed larger amounts of

TABLE IV. AVERAGE DAILY CRUDE PROTEIN AND DRY MATTER CONSUMPTION PER STEER

Lot. No.	I	II	III	IV	V	VI	VII
Designation	Corn silage-alfalfa	No-grain silage-alfalfa	Corn fodder	Alfalfa hay	Clover hay	Mixed hay	Timothy-oat straw
Av. daily crude protein	3.83	3.33	3.16	3.60	3.49	3.52	3.30
Av. daily dry matter	29.85	26.89	24.68	28.45	27.46	28.48	25.92
Av. daily gain	2.64	1.94	1.96	2.38	2.47	2.28	1.99

crude protein daily than the three least gaining lots (II, III and VII). This would seem to indicate that the low gaining lots did not receive a sufficient amount of crude protein to stimulate large gains. In this regard it will be noted that Lot I (silage-alfalfa) made the greatest daily gain and also consumed the largest amount of crude protein daily, the steers in this lot consuming 3.83 pounds of crude protein per head daily. This protein consumption is 0.5 pound or 15 percent greater than in the case of Lot II (no-grain-silage-alfalfa) and 0.67 pound or 21 percent greater than in the case of Lot III (fodder). The correlation between protein consumption figures and rapidity of gains suggests that the protein supplement, cottonseed meal in this experiment, might profitably be increased above the amounts given, this idea of an increase in the high protein feed being especially suggested for the groups receiving no-grain-silage-alfalfa (Lot II), timothy hay (Lot VII) and corn fodder (Lot III). Had these groups received, say 3½ to 4 pounds instead of 3 pounds per steer daily the above mentioned rations would probably have shown up to better advantage. Then too the corn fodder and timothy hay fed groups would, in all reasonable probability, respond favorably to a leguminous hay ad dition, even if only a couple pounds daily could be allowed.

The dry matter consumption shows about the same relation; the high gaining lots were also the high dry matter consumers. In order to stimulate feed consumption the protein allowance should approach the optimum. High daily dry matter consumption is practically always associated with rapid and economical gains, other things being similar.

Average Daily Gains Per Steer

The ranking of the lots according to average daily gains is given in table V.

The steers in Lot I, receiving silage and alfalfa hay, made the largest average daily gains, 2.64 pounds, as compared to 2.47 pounds per steer in Lot V, the second highest gaining lot, which got red clover hay. The gain was 1.94 pounds per steer in Lot II, which did not receive "bunk" grain. This was the

TABLE V. AVERAGE DAILY GAIN PER STEER

Lot I (silage and alfalfa hay)	2.64 pounds
Lot V (red clover hay)	2.47 pounds
Lot IV (alfalfa hay)	2.38 pounds
Lot VI (timothy-clover)	2.28 pounds
Lot VII (timothy hay)	1.99 pounds
Lot III (corn fodder)	1.96 pounds
Lot II (no grain-silage-alfalfa)	1.94 pounds

least gaining lot. Evidently the grain feeding showed results in larger gains by some 26 percent (compare Lots I and II, directly checked against each other).

It will be noted that on the basis of daily gains the lots arrange themselves in two series: first, the lots receiving red clover hay or alfalfa hay or mixed hay. These steers on the average gained respectively 2.47 pounds for Lot V, 2.38 pounds for Lot IV and 2.28 pounds for Lot VI. In the second series we find the lots receiving timothy hay, corn fodder or the no grain ration. The steers in these lots gained respectively 1.99 pounds for Lot VII, 1.96 pounds for Lot III and 1.94 pounds for Lot II.

The gains of steers in the Lots VII (timothy), III (fodder) and II (silage-alfalfa-no grain), averaged approximately seven-tenths of a pound less than the gains made by the steers in Lot I, (full grain-silage-alfalfa) or about 85 pounds per steer for the

Fig. 1. This is a representative steer of Lot I which received a standard corn belt ration of shelled corn, full-fed, cottonseed meal, corn silage, alfalfa hay and salt.

The average steer in this group made a gain of 316 pounds in the four months of feeding, sold for $8.50 per hundredweight, Chicago, and returned a margin over feed costs of $15.13.

Fig. 2. This is a representative steer of Lot II which received a ration of corn silage, cottonseed meal, alfalfa hay and salt.
The average steer in this group made a gain of 233 pounds in the four months of feeding, sold for $7.85 per hundredweight, Chicago, and returned a margin over feed costs of $—0.57 (loss).

total period of 120 days. The influence of this difference in gains will be noted later in the finish and selling price.

Apparently timothy hay and corn fodder were not as efficient roughages in promoting steer gains as were the legumes, red clover hay, alfalfa hay and mixed timothy-clover hay. The combination of corn silage and alfalfa hay proved the most efficient from the standpoint of gains made under the conditions of this experiment. The no grain silage-alfalfa ration produced about as good gains as did the rations containing corn fodder and timothy hay even tho a full grain allowance was given with the latter two roughages.

Dimensional Growth of the Steers During the Four Months Feeding Period

Table VI gives the initial and final measurements taken on the steers by lots together with the computed absolute increase, in inches and in percentages of the original size.

Briefly, these points may well be covered:

1. The steers averaged approximately the same by lots when the feeding started, thus indicating that the allotment was fairly uniform for heights and girths as well as for weights, condition and other factors.

TABLE VI. THE GROWTH OF THE STEERS

Average initial measurements per steer (in inches)

Lot No.	No. of steers	Average initial weight (lbs.)	Girth of heart	Girth of paunch	Height at shoulder (top)	Height at rump (top)
I	7	1113.86	76.21	87.40	51.12	52.13
II	7	1114.76	75.98	87.01	50.39	52.42
III	7	1117.67	76.04	88.19	50.95	52.64
IV	7	1126.47	76.38	88.19	50.73	52.64
V	7	1120.53	74.86	87.68	49.61	51.12
VI	7	1117.00	76.38	87.51	50.45	51.57
VII	7	1106.96	76.21	88.08	50.96	52.19
		Average final weight	Average final measurements per steer			
I	7	1430.31	88.19	95.89	53.77	54.90
II	7	1347.37	86.73	95.16	53.15	54.44
III	7	1353.33	85.49	94.26	53.04	54.73
IV	7	1411.99	85.49	95.22	53.49	54.84
V	7	1417.10	83.69	95.11	52.36	54.44
VI	7	1390.02	84.48	94.49	53.26	54.56
VII	7	1345.84	82.51	93.98	52.19	53.83
			Average absolute increase per steer			
I	7	316.45	11.98	8.49	2.65	2.37
II	7	232.61	10.75	8.15	2.76	2.02
III	7	235.66	9.45	6.07	2.09	2.09
IV	7	285.52	9.11	7.03	2.76	2.20
V	7	296.57	8.83	7.43	2.75	3.32
VI	7	273.02	8.10	6.98	2.81	2.99
VII	7	238.88	6.30	5.90	1.23	1.64
			Percentage increase per steer			
I	7	28.41	15.72	9.71	5.18	4.51
II	7	20.87	14.15	9.37	5.48	3.85
III	7	21.08	12.43	6.88	4.10	3.97
IV	7	25.35	11.93	7.97	5.44	4.18
V	7	26.47	11.80	8.47	5.54	6.49
VI	7	24.44	10.60	7.98	5.57	5.80
VII	7	21.58	8.27	6.70	2.41	3.14

2. The greatest increase in heart and paunch girths was experienced in the two silage fed lots I and II—the heavy grain feeding being conducive to heart girth development (I over II); the heavy grain ingestion with silage likewise contributed to the paunch expansion.

3. The use of corn fodder in place of corn silage and alfalfa hay (compare Lots III and I) resulted in smaller increase in the heart and paunch girths, the heights at shoulder and at rump.

4. The use of alfalfa or clover or mixed hay in the ration as contrasted with the straight timothy and oat straw roughage feeding (compare Lots IV, V and VI with VII) shows greater increases in the two girths taken and a marked augmentation in height at both the shoulder and the rump. Evidently the timothy-oat straw roughage fed in combination with the corn

Fig. 3. This is a representative steer of Lot III which received a ration of shelled corn, cottonseed meal, corn fodder and salt.
The average steer in this group made a gain of 236 pounds in the four months of feeding, sold for $7.75 per hundredweight, Chicago, and returned a margin over feed costs of $4.05.

grain, cottonseed meal and salt was not efficient in promoting growth as contrasted with the roughages, alfalfa, red clover, and timothy-clover fed under similar conditions.

Feed Required for 100 Pounds of Gain

The ranking of the various lots according to the total concentrates required for 100 pounds gain is given in table VII, the greatest being given first. The total roughage requirement is also given for reference.

In a discussion of the concentrates required for 100 pounds

TABLE VII. CONCENTRATES AND ROUGHAGES REQUIRED FOR 100 POUNDS GAIN

	Total concentrates, lbs.	Total roughages, lbs.
Lot VII (timothy hay)	1153.0	315.0
Lot VI (timothy-clover)	1034.5	371.7
Lot III (corn fodder)	981.2	429.4
Lot IV (alfalfa hay)	936.7	402.5
Lot V (clover hay)	902.9	353.5
Lot I (corn silage-alfalfa hay)	795.5	1009.2
Lot II (no grain-corn silage-alfalfa hay)	154.8	3046.7

Fig. 4. This is a representative steer of Lot IV which received a standard corn belt ration of shelled corn, cottonseed meal, alfalfa hay and salt.
The average steer in this group made a gain of 286 pounds in the four months of feeding, sold for $8.25 per hundredweight, Chicago, and returned a margin over feed costs of $10.03.

gain Lot II should not be considered inasmuch as this lot received cottonseed meal as the only concentrate, no shelled corn being fed.

The steers in Lot I (standard corn belt ration), which made the greatest daily gains, required the least amount of concentrates in putting on 100 pounds of gain. It will be noted that these steers had the greatest roughage requirement of all lots with the exception of Lot II (no grain ration).

The greatest concentrate requirement for 100 pounds gain is noted in the timothy hay fed Lot VII, this lot requiring 1153 pounds of concentrates as compared to 795.5 pounds in Lot I, a difference of 357.5 pounds in favor of Lot I. We must not forget that there is considerable corn grain in the silage. Lot VII required a total of 315 pounds of roughage for 100 pounds gain. The difference in roughage requirements of Lots I and VII are due in part to the fact that Lot I was fed the succulent roughage, corn silage, while Lot VII received only the dry roughages timothy hay and oat straw.

Lots III and VII made very similar gains during the feeding period, hence it is of interest to compare the feed requirements of the steers in these lots. Lot VII required 1153 pounds of

concentrates for 100 pounds gain as compared to 981.2 pounds for Lot III. This is a difference of 171.8 pounds, 18 percent, of concentrates in favor of Lot III. Lot III, however, required 37 percent more roughage than Lot VII.

Lot VI, fed mixed timothy-clover hay, had a greater concentrate requirement than did Lot III (fodder), altho the former made approximately 16 percent greater gains than did the latter.

As will be noted from the figures Lot I (corn silage-alfalfa) made gains with less of the expensive concentrates and more of cheaper roughages than any of the comparable lots. This is an item well worthy of consideration from the standpoint of economical beef production. It will be noted later that Lot I put on gains at less cost than any other lot except Lot V (red clover).

Table VIII shows the feed requirement for 100 pounds of gain by 30 day periods.

TABLE VIII. FEED REQUIRED FOR 100 POUNDS OF GAIN BY 30-DAY PERIODS (POUNDS)

	Dec. 10, 1921, to Jan. 9, 1922	Jan. 9, 1922, to Feb. 8, 1922	Feb. 8, 1922, to Mar. 10, 1922	Mar. 10, 1922, to Apr. 9, 1922	Dec. 10, 1921, to Apr. 9, 1922
Lot I					
Shelled corn	434.6	577.3	615.8	1610.6	681.7
Cottonseed meal	110.8	91.0	93.1	227.3	113.8
Corn silage	1244.9	698.2	651.7	1266.3	895.5
Alfalfa hay	130.7	84.2	94.0	201.0	113.7
Block salt	.21	.29	.47	.85	.40
Lot II					
Cottonseed meal	143.1	100.2	146.5	488.8	154.8
Corn silage	2470.5	1831.5	2720.9	9399.5	2838.3
Alfalfa hay	219.8	132.4	201.9	562.5	208.4
Block salt	.48	.38	.60	2.54	.64
Lot III					
Shelled corn	873.8	774.0	609.8	1310.4	828.4
Cottonseed meal	222.9	142.4	101.6	206.8	152.8
Corn fodder	868.4	362.1	274.4	435.6	429.4
Block salt	1.59	1.42	.92	1.73	1.32
Lot IV					
Shelled corn	811.4	702.3	762.8	1263.9	852.6
Cottonseed meal	124.5	68.7	64.6	105.2	84.1
Alfalfa hay	944.3	257.8	269.7	382.5	402.5
Block salt	.33	.56	.29	.37	.39
Lot V					
Shelled corn	553.2	770.8	786.1	1323.0	822.0
Cottonseed meal	84.8	71.2	67.7	113.4	80.9
Clover hay	589.7	235.0	283.4	344.0	353.5
Block salt	1.23	.85	1.00	1.42	1.09
Lot VI					
Shelled corn	675.3	758.2	836.4	1864.1	924.6
Cottonseed meal	129.4	82.4	88.7	190.1	109.9
Mixed hay	731.3	234.4	237.7	447.7	371.7
Block salt	.71	.88	.81	1.45	.91
Lot VII					
Shelled corn	596.1	979.9	999.9	1728.9	1002.3
Cottonseed meal	137.1	138.0	130.4	231.1	150.7
Timothy hay	485.9	220.5	202.2	288.7	299.3
Oat straw	32.2	5.0	6.2	22.8	15.7
Block salt	.37	.55	.54	1.10	.59

TABLE IX. CRUDE PROTEIN AND DRY MATTER REQUIRED FOR 100 POUNDS GAIN

Lot No.	I	II	III	IV	V	VI	VII
Designation	Silage-alfalfa	No grain silage-alfalfa	Corn fodder	Alfalfa	Clover	Mixed hay	Timothy-oat straw
Crude protein required	145.16	171.86	160.73	151.08	141.19	154.51	165.35
Dry matter required	1131.64	1389.52	1257.01	1194.43	1113.01	1251.15	1298.61
Av. daily crude protein	3.83	3.33	3.16	3.60	3.49	3.53	3.30

Crude Protein and Dry Matter Required for One Hundred Pounds Gain

The figures presented in table IX show the amounts of crude protein and dry matter required for 100 pounds gain.

The lots which made the smallest daily gains also required the greatest amounts of crude protein and dry matter for 100 pounds gain. On the other hand the four groups consuming the most protein daily (Lots I, IV, V and VI) likewise made the greatest gains and also took the least protein for the unit of gains made.

The dry matter requirements for the hundredweight of gain

Fig. 5. This is a representative steer of Lot V which received a standard corn belt ration of shelled corn, cottonseed meal, red clover hay and salt.

The average steer in this group made a gain of 297 pounds in the four months of feeding, sold for $8.25 per hundredweight, Chicago, and returned a margin over feed costs of $13.41.

Fig. 6. This is a representative steer of Lot VI which received a ration of shelled corn, cottonseed meal, mixed timothy-clover hay and salt.
The average steer in this group made a gain of 273 pounds in the four months of feeding, sold for $8.15 per hundredweight, Chicago, and returned a margin over feed costs of $8.73.

made are apparently lessened materially by a sufficiency in daily protein intake, when said protein is supplied, in a full-fed grain with cottonseed meal ration, by silage and the legume hays instead of corn fodder, or timothy and oat straw.

Cost of Feed for 100 Pounds Gain on Steers

The rank of the various lots as regards cost of feed for 100 pounds gain on the basis of feed prices previously stated is shown in table X, the lowest cost being given first.

When we consider the feed cost for 100 pounds gain on all

TABLE X. NET COST OF FEED FOR 100 POUNDS GAIN ON STEERS

	Not considering hogs	Crediting pick-ups*	Crediting hog gains at $9.00
Lot V (Red clover hay)	$10.65	$10.18	$ 9.22
Lot I (corn silage-alfalfa hay)	$11.11	$10.47	$ 9.32
Lot IV (alfalfa hay)	$12.13	$11.45	$10.21
Lot VI (mixed hay)	$12.47	$11.74	$10.45
Lot III (fodder)	$12.67	$12.13	$10.99
Lot II (no grain-corn silage-alfalfa hay)	$13.32	$13.37	$12.02
Lot VII (timothy hay)	$13.45	$12.89	$11.71

*This column presents the most reliable comparative figures from the steer feeding efficiency standpoint; the column headed, "Crediting Hog Gains at $9.00" is useful when the steers on feed and hogs following are regarded as a combination enterprise.

three considerations we find that the lots hold practically the same rank thruout with the exception of Lots II (no grain-corn-silage-alfalfa) and VII (timothy). The least feed costs on the basis of the three different methods of calculation were found in Lot V (red clover hay), while the greatest feed costs are noted in Lots II (no grain-corn silage-alfalfa) and VII (timothy).

Feed Credits for Hogs Following

"Crediting pick-up" is the best way to be fair to both steers and hogs. In that way the steers are given credit for the nutrients which the hogs recovered from the steer droppings, this credit being deducted from their feed cost. If the steer droppings are of so little value to the hogs following that it actually takes more corn and tankage (hand-fed) for a given amount of gain on the hogs than were required for the same amount of gain on the self-fed check lot of hogs, the steers should not receive credit for hog profits made on the actual corn and tankage for which these hogs are paying market prices, just the same as are the check lot of hogs.

On the other hand, it is not quite fair to the steers to charge them for any loss realized on the hogs on the basis of crediting pick-up. If the hogs following any group of steers could not get enough out of the steer droppings to compensate them for the conditions under which they lived following the steers, the figures on the basis of "not crediting hogs" are the ones to use for that group of steers as is the case with Lot II in this experiment. The steers should not be made to buy corn and tankage for the hogs. Figures on the basis of crediting hog profits are included for the comparison inasmuch as that system has been generally in use in the past.

TABLE XI. FEED EQUIVALENT SAVED BY HOGS FOLLOWING STEERS (POUNDS)

Lot No.	Designation	Total per lot		Per 100 pounds of steer gains		Percent of feeds fed steers in grain bunk	
		Shelled Corn	Tankage	Shelled corn	Tankage	As corn grain only	As total concentrate and corn equivalent
I	Corn silage and alfalfa hay	1662.2	65.3	75.0	3.0	11.0	10.2
II	No grain-silage and alfalfa hay	—314.9	49.0	—19.3	3.0	.....	—8.6
III	Corn fodder	1070.2	35.6	64.9	2.2	7.8*	7.1*
IV	Alfalfa hay	1589.0	62.8	79.5	3.1	9.3	9.2
V	Clover hay	1174.2	38.7	56.6	1.9	6.9	6.7
VI	Mixed timothy-clover hay	1603.8	62.8	83.9	3.3	9.1	8.8
VII	Timothy hay	1112.9	37.0	66.6	2.2	6.6	6.2

*This percentage would have been much lower had the hard corn grain in the fodder consumed been counted as bunk grain, or respectively 5.63 and 5.30 percent.

Figures covering the feed equivalent saved by the hogs following the steers are presented in table XI. These figures show the total feed saved per lot, feed saved per 100 pounds of steer gains and the percent saved of the feeds fed the steers. The latter figures are given as percent of corn grain and percent of total concentrates fed steers based on corn equivalent. The corn equivalent is obtained by adding to the weight of corn grain saved twice the weight of the tankage saved.

It will be noted that the hogs in Lot II did not save any corn grain but were fed extra corn grain, as compared to the check hogs, to produce their gains. This might be expected since the steers in Lot II on corn silage-alfalfa hay-cottonseed meal and salt were fed no hard dry corn grain in the bunk. The only corn grain this lot received was that from the corn silage. This grain is rather soft and digestible, hence voided in very small quantity. It is evident therefore that it was not an economical proposition to have fattening hogs following cattle on a no grain ration, under the conditions of this experiment.

It is considered good practice on the farm to follow steers, fed as these were with stocker and growing pigs, if available, or with active brood sows, if the steers are not too wild and the sows not too far advanced in pregnancy. Local conditions

Fig. 7. This is a representative steer of Lot VII which received a ration of shelled corn, cottonseed meal, timothy hay, oat straw and salt.
The average steer in this group made a gain of 239 pounds in the four months of feeding, sold for $7.90 per hundredweight, Chicago, and returned a margin over feed costs of $4.15.

should determine just what practice is best, but the fattening hogs get so little feed from cattle fed corn silage-alfalfa hay-cottonseed meal and salt that they are better off in the hog fattening yards.

The greatest saving of voided feed was in Lot I, full-fed on shelled corn, the hogs in this lot recovering more corn or corn equivalent than the hogs in any other lot. These hogs recovered around 10 percent of the concentrated feeds fed to the steers.

The other lots vary somewhat, the percentage of corn equivalent saved ranging from 6.2 percent in Lot VII (timothy) to 9.2 percent in Lot IV (alfalfa).

Necessary Selling Price on Steers to Break Even

The necessary selling price per hundredweight of the steers, in order to break even, is figured by dividing the sum of the initial cost per steer at the beginning and the total feed cost per steer thruout the experiment by the final weight per steer at the close. It is given in table XII on the basis of not considering the hogs, of crediting "pick-up" and of crediting hog gains at $9.00.

In table XII we note the differences in necessary selling price when figured according to the different methods. When pork is credited at $9.00 we note that the steers in the various lots could have sold for from 20 to 26 cents less per 100 pounds, and still have broken even, than when the pick-up was credited.

The steers in Lot I (corn silage and alfalfa), altho they made greater gains than the steers in the other lots, would have had to sell for more than the steers in Lot V (red clover). The other lots would have had to sell for somewhat more than Lot I in order to break even. It will be noted that Lot II, (no grain ration) had a higher necessary selling price when pick-up was credited than when hogs were not considered, indicating that the hogs were not able to recover enough feed from the steer droppings to warrant their following the steers.

TABLE XII. NECESSARY SELLING PRICE ON STEERS PER 100 POUNDS TO BREAK EVEN AT AMES

	Not considering hogs	Crediting pick-up	Crediting pork at $9.00
Lot V (red clover hay)	$6.55	$6.45	$6.25
Lot I (standard)	$6.71	$6.57	$6.31
Lot III (fodder)	$6.72	$6.62	$6.42
Lot IV (alfalfa hay)	$6.81	$6.67	$6.42
Lot II (no grain)	$6.82	$6.83	$6.59
Lot VI (mixed hay)	$6.84	$6.69	$6.44
Lot VII (timothy)	$6.88	$6.78	$6.57

TABLE XIII. SHRINKAGE ENROUTE TO MARKET, AMES TO CHICAGO

	Shrinkage per head	
	Pounds	Percentage
Series A: Based on three weights at close of experiment		
Lot VII (timothy hay)	51.55	3.83
Lot VI (mixed hay)	54.30	3.91
Lot III (corn fodder)	56.19	4.15
Lot V (red clover hay)	59.96	4.23
Lot I (corn silage-alfalfa hay)	61.74	4.32
Lot IV (alfalfa hay)	61.99	4.39
Lot II (no grain-corn silage-alfalfa hay)	98.80	7.33
Average straight	63.51	4.59
Series B: Based on final single weight taken before shipping		
Lot III (corn fodder)	42.86	3.20
Lot VI (mixed hay)	60.00	4.30
Lot V (red clover hay)	61.43	4.33
Lot VII (timothy hay)	60.00	4.43
Lot IV (alfalfa hay)	64.29	4.55
Lot I (corn silage-alfalfa hay)	65.71	4.58
Lot II (no grain-corn silage-alfalfa hay)	85.71	6.42
Average straight	62.86	4.55

SHIPPING, SELLING AND SLAUGHTER DATA

Shrinkage in Shipping—Ames to Chicago

Two shrinkage figures are given in table XIII, one based on the three weights of the steers at the close of the experiment April 9, the other based on a final single weight taken immediately before the cattle were loaded. The steers were in the cars about 32 hours. The actual pounds shrink per steer and the percent shrink are given in table XIII. The lots are ranked according to shrink, least first.

The average shrinkage per steer, using the three weights basis, was 63.51 pounds per head, or 4.59 percent. There was an apparent tendency for the steers getting the poorer roughages to shrink less enroute to market. This sounds logical inasmuch as these steers were consuming less feed in the last 30 days, hence it is assumed they had less total alimentary contents subject to shrinkage.

The cattle receiving no grain with heavy silage and alfalfa hay showed, easily, the largest shrinkage, or some 20 to 27 pounds per head, depending on which weights were taken, over the next highest shrinking lot. Cattle fed in this manner might well be fed grain and considerable dry roughage a few weeks before shipping.

Table XIV shows the cost of shipping plus the value of shrink, this value of shrink being calculated on actual Chicago selling values, which will be discussed later.

The figures given in table XIV indicate that in all cases, with

TABLE XIV. COST PER HUNDREDWEIGHT OF SHIPPING AND SHRINKAGE ENROUTE TO MARKET

(Represents difference necessary between Ames (home weights taken) and Chicago (Chicago weights taken) selling values per hundredweight in order to have steers net the same dollars and cents per head, both places.)

Lot VII (timothy hay)	$0.81
Lot III (corn fodder)	0.83
Lot VI (mixed hay)	0.83
Lot V (red clover hay)	0.86
Lot IV (alfalfa hay)	0.87
Lot I (corn silage-alfalfa hay)	0.87
Lot II (no grain-corn silage-alfalfa hay)	1.07

the exception of Lot II (no grain-silage and alfalfa), a previously estimated shipping cost of one dollar per hundredweight was more than enough to cover the actual cost.

Actual Selling Price in Chicago

The steers were sold on the Chicago market April 14. They went to Swift & Co., Mr. Boyle doing the bidding.

The steers were separated into the various lots according to the rations they received during the feeding period and valuations were placed on each lot without the buyers knowing what rations had been fed.

The lots are ranked according to selling price as indicated in table XV.

The selling values indicate how the different lots of cattle appealed to the packers. Lot I, fed the standard corn belt ration, appeared to the packers to be worth more than any of the other lots. Apparently Lot I, full-fed on corn silage in conjunction with shelled corn, cottonseed meal, alfalfa hay and block salt, presented a more finished appearance than the comparable lots receiving dry roughages, since Lot I sold for 25 cents more per hundredweight than did the next best selling lots IV (alfalfa), and V (red clover).

The selling values give further proof that good legume hays are more efficient in economical beef production than are timothy hay and corn fodder, even tho cottonseed meal is fed liberally with these rough feeds.

It is interesting to note that the steers fed the no grain ration

TABLE XV. ACTUAL CHICAGO SELLING VALUES OF STEERS PER HUNDREDWEIGHT

Lot I (corn silage-alfalfa hay)	$8.50
Lot IV (alfalfa hay)	8.25
Lot V (red clover hay)	8.25
Lot VI (mixed hay)	8.15
Lot VII (timothy hay)	7.90
Lot II (no grain-silage-alfalfa hay)	7.85
Lot III (corn fodder)	7.75

sold for 10 cents more per hundredweight than did the corn fodder fed steers and for only 5 cents less than the timothy hay fed steers.

Margin per Steer over Feed Cost Based on Actual Chicago Selling Price

While the points covered herein-before give much practical information concerning the comparison of the various rations under consideration, the figures of margin per steer over feed costs constitute a final summary of the composite financial results of the controlling economic factors. The margin per steer over feed cost is therefore of great value to the practical farmer because it presents the financial summation of the experiment in terms of dollars and cents.

The seven lots are ranked in table XVI according to the margin returned per steer over feed costs.

On the basis of crediting pick-up, Lot I returned a margin per steer over feed cost of $15.13, or $1.72 more than the next best lot, Lot V (red clover hay). The steers in the latter lot, which received red clover hay as the lone roughage, returned a margin of $13.41 as compared to $10.03 for Lot IV, which received alfalfa hay. Had the alfalfa been charged at $16.00 a ton, as was the red clover, the steer margin would have been $12.33, approx-

TABLE XVI. MARGIN PER STEER OVER FEED COSTS

Not considering hogs	
Lot I (corn silage and alfalfa hay)	$13.09
Lot V (red clover hay)	12.00
Lot IV (alfalfa hay)	8.08
Lot VI (mixed hay)	6.76
Lot VII (timothy hay)	2.81
Lot III (fodder)	2.76
Lot II (no grain-corn silage and alfalfa hay)	—0.46 (loss)
Crediting pick-up	
Lot I (corn silage and alfalfa hay)	$15.13
Lot V (red clover hay)	13.41
Lot IV (alfalfa hay)	10.03
Lot VI (mixed hay)	8.73
Lot VII (timothy)	4.15
Lot III (fodder)	4.05
Lot II (no grain-corn silage and alfalfa hay)	—0.57 (loss)
Crediting pork at $9.00	
Lot I (corn silage and alfalfa hay)	$18.76
Lot V (red clover hay)	16.25
Lot IV (alfalfa hay)	13.56
Lot VI (mixed hay)	12.27
Lot VII (timothy hay)	6.98
Lot III (fodder)	6.73
Lot II (no grain-corn silage and alfalfa hay)	2.57

imately the same as with the clover fed steers. Lot VI returned a still smaller margin, $8.73, followed in order by Lots VII (timothy), III (corn fodder) and II (no grain-silage and alfalfa).

Lot II, the no grain-silage and alfalfa lot, returned a loss margin of $0.57 on the basis of crediting pick-up and a loss margin of $0.46 when hogs were not considered. It is evident that the hogs following the steers in this lot did not recover sufficient feed from the steer droppings to warrant the hogs being there, but rather each steer was charged $0.11 for the privilege of having the hogs in the lot. On the other hand each steer in the other lots received credits from $1.29 to $2.04 for the feed saved by the hogs.

It is seen therefore that under the conditions of this experiment the standard corn silage-alfalfa ration returned the greatest margin per steer over feed cost, followed in order by the red clover hay ration, the alfalfa hay ration, the mixed hay ration, the timothy hay ration, the corn fodder ration and the no grain ration.

Prices at Which it Would Have Been Necessary to Buy Roughages per Ton in Order to Make the Same Margin per Steer Over Feed Costs as Was Made in the Check Lot I

Under the conditions of this experiment none of the roughage fed lots returned as much margin over feed costs as did the corn silage-alfalfa ration fed Lot I, whose roughage was corn silage primarily but with enough alfalfa hay allowed to satisfy the steers' craving for dry roughness. In fact it would have been necessary in every case to have bought the roughages used at less than they were actually charged in order to make the same margin as the check Lot I. Table XVII shows the prices that one could have paid for the roughages on the above basis.

TABLE XVII. VALUE PER TON OF ROUGHAGES TO PERMIT RETURN OF THE SAME MARGIN OVER FEED COSTS AS THE STEERS OF CHECK LOT I, THE CORN SILAGE BEING CHARGED AT $5.50 PER TON.

	Corn fodder	Red clover hay	Alfalfa hay	Mixed hay	Timothy and oat straw combination (proportion of 19:1 by weight)
Excluding hogs	$—4.20	$13.92	$11.27	$ 5.02	$— 9.72
Crediting pick-up	—5.35	12.71	11.12	4.88	—11.59
Crediting hog gains at $9.00	—6.78	11.21	10.94	4.70	—13.73

Explanatory note: A minus (—) sign preceding the value as computed means that the roughage in question was actually a "money loser" as compared to Lot I, wherein corn silage is charged at $5.50 the ton, and other feeds as herein-before stated. For example, on the basis of crediting pick-up, the timothy hay and oat straw combination, fed in the proportion of 19 to 1, shows $ — 11.59, or that the feeder would have to have $11.59 bonus for every ton of this "19 to 1" combination fed even tho he had the two feeds free for feeding. Evidently the timothy-oat straw combination of roughages is a relatively poor one for fattening cattle by the methods used in this experiment.

Red clover hay under the conditions of this experiment proved to be worth more nearly what it cost than any of the other roughages fed. Red clover hay was worth, crediting pick-up, $12.71 per ton as compared to a cost price of $16.00 per ton. The alfalfa hay would have had to have been purchased for $11.12 per ton whereas it is charged at $20.00; the mixed hay for $4.88 but it cost $17.50; the timothy hay and oat straw combination for $-11.59; and the corn fodder for $-5.35.

Here again we see clearly that the leguminous hays, red clover and alfalfa, together with corn silage, when properly supplemented, are roughages of relatively high feeding value.

If the clover hay Lot V is taken as a basis for figuring the relative value of the other roughages as fed in the corresponding lots, we find that in order to make the margin of $13.41 per steer, this after crediting pick-up secured by the hogs following, the corn fodder steers would have to have a bonus of $2.73 per ton fed. The alfalfa hay would be worth $14.12 per ton or 88 percent of the red clover; the mixed timothy-clover hay would net $8.28 per ton, or 52 percent of the clover. The timothy-oat straw combination would require a bonus of $7.01 per ton to play even with the clover at $16.00 the ton, and the straight timothy hay would have to be allowed a bonus of $7.91 for each ton fed in order to return to the feeder as much as $13.41 per steer over feed costs. Red clover and alfalfa thus again show up as superior dry roughages.

Packing House Returns on Steers in Experiment

The steers, after they were sold, were followed thru the packing plant and figures obtained on the killing out of each lot. Data were also secured on the financial returns to the packer.

The packing house returns are discussed below, with a summary of costs and credits on each lot of steers and finally what the packer should have paid for each lot in order to break even as compared to what was actually paid for the steers.

Dressing Percentages

The dressing percentages are figured on two bases, the average home weights at the close of the experiment and the Chicago selling weights. These percentages are given in table XVIII in order of the highest first.

The dressing percentages based on home weights in Lots V (clover), I (silage and alfalfa) and VI (mixed hay) were very close, the lots ranking in the order given. There was only a quarter of one percent difference in these lots The lots next in rank were III (fodder), IV (alfalfa) and VII (timothy). The dressing percentage in these lots was fairly close, being about

TABLE XVIII. DRESSING PERCENTAGES

Lot No.	Ration	Based on average weight at close of experiment	Based on Chicago selling weight
V	Red clover hay	58.56	61.15
I	Corn silage and alfalfa hay	58.38	61.01
VI	Mixed hay	58.30	60.67
III	Corn fodder	57.49	59.98
IV	Alfalfa hay	57.26	59.89
VII	Timothy hay	57.01	59.28
II	No grain–corn silage and alfalfa hay	55.95	60.38

1 percent lower than the three highest dressing lots. Lots II (no grain-silage and alfalfa) had easily the smallest dressing percentage of all when based on home weights, it dressing nearly 3 percent under the best lot. This low dressing percent in Lot II is partially accounted for by the heavy shrinkage of this lot in shipment. It will be remembered that the steers in this lot shrank nearly twice as much enroute to market as the steers in the other lots. When dressing percent is based on Chicago weights this lot takes an entirely different rank, dressing over 60 percent.

It is of interest to note the rank of the silage fed lots as to dressing percentage based on home weights. Lot I, fed the standard corn belt ration, was second in rank while Lot II which received no grain but which consumed over twice as much silage per day as Lot I ranked last.

Based on Chicago selling weights the lots dressed out in the same order as when based on home weights with the exception of the no grain fed Lot II. This lot, which ranked last on the latter basis, ranked fourth in dressing percentage based on Chicago weights.

A study of the figures obtained in this experiment would seem to indicate that there is but little correlation between the dressing percentage of the steers at Chicago and the kind of roughage fed. There does appear to be some correlation, however, between the gains made from the start of the experiment to the Chicago selling weights and the dressing percentages, the dressing yield increasing as the added weight put on increases. However there is one outstanding exception, Lot II (no grain-silage and alfalfa) gaining lightly, or 134 pounds from Dec. 10, Ames, to April 14, Chicago, and dressing 60.38, much higher than this gain would justify. It is but natural to think that the greater the addition of weight between markets the higher should be the terminal dressing percentage, unless, of course, an extraordinarily long period, relatively, was taken for the putting on of the gain in question.

TABLE XIX. PERCENTAGES OF FATS AND HIDES RECOVERED IN SLAUGHTER OF STEERS

(Based on Chicago weights of average steer)

	Caul fat		Ruffle fat		Other fats		Total fats		Green hides	
	Wt.	Percentage	Wt.	Percentage	Wt.	Percentage	Wt.	Percentage	Wt.	Percentage
Lot I	17.4	1.27	44.1	3.23	29.4	2.15	90.9	6.65	78.7	5.75
Lot II	16.1	1.29	30.9	2.47	21.6	1.73	68.6	5.49	86.1	6.90
Lot III	17.6	1.35	43.6	3.36	28.7	2.21	89.9	6.93	78.4	6.05
Lot IV	17.1	1.27	48.6	3.60	31.4	2.33	97.1	7.20	83.4	6.18
Lot V	21.4	1.58	58.4	4.31	38.3	2.82	118.1	8.71	81.6	6.01
Lot VI	16.0	1.20	71.4	5.35	41.9	3.13	129.3	9.68	75.7	5.67
Lot VII	16.7	1.29	49.0	3.79	30.9	2.38	103.7	7.46	73.6	5.68

Data on Fats and Hides

Data were secured on the actual weights and percentages of the different kinds of by-product fats and on the hides. The weight and percentage figures are given in table XIX.

In table XX are given figures showing the relative value of the several lots of steers to the packer. These figures indicate how nearly the packer buyer's price on the various lots was justified by the returns which were realized from the steers.

The costs of killing and dressing the animals, in fact the whole operation from the time the animals were bought until the dressed carcasses were delivered to the cooler and the byproducts disposed of, were $0.35 per hundredweight for Lots I and V, $0.36 per hundredweight for Lots IV and VI, and $0.37 per hundredweight for Lots II, III and VII. The total cost of handling the beef in the cooler, icing and selling etc. was $1.25 per hundredweight for each lot. These cost figures are based on averages of actual costs in the packing house.

In arriving at the credits for by-products, the hides and various fats obtained from each group of steers were weighed and credited at market values. The blood, offal, etc., were credited at average figures per hundredweight of beef returned. The selling values were estimated on the cold carcasses in the coolers.

It will be noted that on every lot in this particular experiment the packers lost money. In many other cattle feeding and slaughtering experiments the margins have gone the other way —otherwise the packing business would not be profitable. In Lot I the packers lost $11.30 per steer while in Lot III they lost $2.07. When we compare the actual live steer selling values with what the packer could have afforded to pay for the cattle we have an interesting series of comparative figures. These are presented in table XXI.

These figures indicate that the packer buyer paid from $0.14 to $0.83 per hundredweight, or an average (straight) of $0.45 too much for these steers. In other words the packer buyer on this particular market over-estimated the real "killing out"

TABLE XX. SUMMARY OF PACKING HOUSE DATA ON STEERS

	Lot I Standard cornbelt ration	Lot II No grain ration	Lot III Corn fodder	Lot IV Alfalfa hay	Lot V Red clover hay	Lot VI Mixed hay	Lot VII Timothy hay
Chicago selling weight per steer (pounds)	1368.6	1248.6	1297.1	1350.0	1357.1	1335.7	1294.3
Chicago selling price, live steers:							
Per cwt.	$8.50	$7.85	$7.75	$8.25	$8.25	$8.15	$7.90
Per steer	$116.33	$98.01	$100.53	$111.38	$111.96	$108.86	$102.25
Weight of dressed carcass per steer (pounds)	835.0	753.9	778.0	808.6	829.9	810.4	767.3
Dressing percentage, cold weights	61.01	60.38	59.98	59.89	61.15	60.67	59.28
Cost of killing, handling, selling and icing:							
Per cwt.	$1.60	$1.62	$1.62	$1.61	$1.60	$1.61	$1.62
Per steer	$13.36	$12.21	$12.60	$13.02	$13.28	$13.05	$12.43
Total cost per steer to packer (including by-products)	$129.69	$110.22	$113.13	$124.39	$125.24	$121.91	$114.68
Credits for all by-products—hides, fats, blood, offal, etc., per steer	$14.01	$12.29	$13.81	$14.18	$15.40	$15.25	$13.97
Net cost to packer per carcass of dressed beef sold and delivered	$115.68	$97.93	$99.32	$110.21	$109.84	$106.66	$100.71
Actual selling value of beef:							
Per cwt.	$12.50	$12.50	$12.50	$12.50	$12.50	$12.50	$12.50
Per carcass	$104.38	$94.23	$97.25	$101.07	$103.73	$101.30	$95.91
Packer's margin of profit or loss per steer	$—11.30	$—3.70	$—2.07	$—9.14	$—6.11	$—5.35	$—4.80
Price packer should have paid per cwt. for live animals to break even	$7.67	$7.55	$7.59	$7.57	$7.80	$7.75	$7.53

TABLE XXI. SELLING VERSUS ACTUAL VALUES OF STEERS PER HUNDREDWEIGHT BASED ON LIVE WEIGHTS IN BOTH CASES

	What the steers actually brought per cwt.	What the packers found the steers to be worth per cwt. (crediting dressed carcasses and by-products)	Difference showing computed loss to packer per cwt.
Lot I (corn silage and alfalfa hay)	$8.50	$7.67	$—0.83
Lot II (no grain–silage and alfalfa hay)	7.85	7.55	—0.30
Lot III (corn fodder)	7.75	7.59	—0.14
Lot IV (alfalfa hay)	8.25	7.57	—0.68
Lot V (clover hay)	8.25	7.80	—0.45
Lot VI (mixed timothy–clover hay)	8.15	7.75	—0.40
Lot VII (timothy hay)	7.90	7.53	—0.37
Average (straight)	$8.09	$7.64	$—0.45

value of the steers as judged from the outside, hides on. On a down market, say of 50 cents per hundredweight due to the dressed products and by-products declining, such a performance is in line with actualities. Even on the same day cattle of similar weight, breeding, quality and dressing ability often sell from 25 to 60 cents apart.

Relatively speaking, judging from the way the cattle "killed out" in the packing house, it appears that the Lot I, (silage and alfalfa) sold too high; the packers over-bid on them. On the other hand Lot IV (alfalfa hay) were undervaluated. As contrasted with Lot I they sold for 15 cents per hundredweight too low.

Using the 45 cents average figure (see table XXI) as the guide, and disregarding 5 cent differences, Lot IV (alfalfa) sold too high by some 20 to 25 cents as likewise did the check lot I (silage and alfalfa) by some 35 to 40 cents. On the other hand Lot III (fodder) was undersold by some 30 cents.

Had the corn fodder Lot III sold on an equitable basis, as judged from the net value of their carcasses and by-products, with the corn silage and alfalfa fed cattle, Lot I, check, or for 69 cents more, the returns would have been $8.94 per steer greater; thus they would have yielded a margin over feed costs of $12.99 ($8.94 plus $4.05, margin as actually secured) or $2.14 below Lot I with its $15.13 margin per steer—making the financial results between the fodder and silage fed, under similar conditions, close. However, it is what the cattle actually bring in the yards that counts, and not what they should have brought. If a feed like linseed oilmeal or cottonseed meal for instance will put a bloom and superior "eye" finish on cattle, thus causing them to sell for actually more than they deserve, comparatively, then that is to the sellers' and feeders' advantage. If

TABLE XXII. SEVEN LOTS OF SEVEN STEERS EACH FED FROM DEC. 10, 1921, TO APRIL 9, 1922, 120 DAYS DATA BY PERIODS AND TOTAL FOR ENTIRE TEST. ALL FIGURES IN POUNDS

							Total feed allowed (charged) all steers									
	Total initial weight	Total final weight	Average initial weight	Average final weight	Total Gain	Average daily gain per steer	Shelled corn	Cotton-seed meal	Corn silage	Corn fodder	Alfalfa hay	Clover hay	Mixed hay	Timothy hay	Oat straw	Block Salt
Lot I—Ration: Shelled corn—cottonseed meal—corn silage—alfalfa hay—block salt.																
Dec. 10-Jan. 9	7797	8366	1113.86	1195.10	568.70	2.708	2471.26	630	7080	None	743	None	None	None	None	1.20
Jan. 9-Feb. 8	8366	9058	1195.10	1294.04	692.60	3.298	3998.40	630	4836	None	583	None	None	None	None	2.00
Feb. 8-Mar. 10	9058	9735	1294.04	1390.71	676.70	3.222	4167.23	630	4410	None	636	None	None	None	None	3.20
Mar. 10-Apr. 9	9735	10012	1390.71	1430.31	277.18	1.320	4464.37	630	3510	None	557	None	None	None	None	2.35
Entire period	7797	10012	1113.86	1430.31	2215.18	2.637	15101.26	2520	19836	None	2519	None	None	None	None	8.75
Lot II—Ration: Cottonseed meal—corn silage—alfalfa hay—block salt.																
Dec. 10-Jan. 9	7803	8244	1114.76	1177.67	440.40	2.097	None	630	10880	None	968	None	None	None	None	2.10
Jan. 9-Feb. 8	8244	8873	1177.67	1267.53	629.00	2.995	None	630	11520	None	833	None	None	None	None	2.40
Feb. 8-Mar. 10	8873	9303	1267.53	1328.96	430.00	2.048	None	630	11700	None	868	None	None	None	None	2.60
Mar. 10-Apr. 9	9303	9432	1328.96	1347.37	128.89	.614	None	630	12115	None	725	None	None	None	None	3.27
Entire period	7803	9432	1114.76	1347.37	1628.29	1.938	None	2520	46215	None	3394	None	None	None	None	10.37
Lot III—Ration: Shelled corn—cottonseed meal—corn fodder—block salt.																
Dec. 10-Jan. 9	7824	8106	1117.67	1158.04	282.60	1.346	2469.30	630	None	2454	None	None	None	None	None	4.50
Jan. 9-Feb. 8	8106	8549	1158.04	1221.24	442.40	2.107	3424.10	630	None	1602	None	None	None	None	None	6.30
Feb. 8-Mar. 10	8549	9169	1221.24	1309.81	620.00	2.952	3780.80	630	None	1701	None	None	None	None	None	5.70
Mar. 10-Apr. 9	9169	9473	1309.81	1353.33	304.61	1.451	3991.49	630	None	1327	None	None	None	None	None	5.26
Entire period	7824	9473	1117.67	1353.33	1649.61	1.964	13665.70	2520	None	7084*	None	None	None	None	None	21.76
Lot IV—Ration: Shelled corn—cottonseed meal—alfalfa hay—block salt. *Represents edible portion.																
Dec. 10-Jan. 9	7885	8223	1126.47	1174.67	337.40	1.607	2737.81	420	None	None	3186	None	None	None	None	1.10
Jan. 9-Feb. 8	8223	8834	1174.67	1262.00	611.30	2.911	4293.41	420	None	None	1576	None	None	None	None	3.40
Feb. 8-Mar. 10	8834	9485	1262.00	1354.96	650.70	3.099	4963.40	420	None	None	1755	None	None	None	None	1.90
Mar. 10-Apr. 9	9485	9884	1354.96	1411.99	399.21	1.901	5045.76	420	None	None	1527	None	None	None	None	1.47
Entire period	7885	9884	1126.47	1411.99	1998.61	2.379	17040.37	1680	None	None	8044	None	None	None	None	7.87

Lot V—Ration: Shelled corn—cottonseed meal—clover hay—block salt.																
Dec. 10-Jan. 9	7844	8339	1120.53	1191.29	495.30	2.359	2739.77	420	None	None	None	2921	None	None	None	6.10
Jan. 9-Feb. 8	8339	8929	1191.29	1275.61	590.30	2.811	4550.06	420	None	None	None	1387	None	None	None	5.00
Feb. 8-Mar. 10	8929	9549	1275.61	1364.19	620.00	2.952	4874.07	420	None	None	None	1757	None	None	None	6.20
Mar. 10-Apr. 9	9549	9920	1364.19	1417.10	370.39	1.764	4900.28	420	None	None	None	1274	None	None	None	5.25
Entire period	7844	9920	1120.53	1417.10	2075.99	2.471	17064.17	1680	None	None	None	7339	None	None	None	22.55
Lot VI—Ration: Shelled corn—cottonseed meal—mixed hay—block salt.																
Dec. 10-Jan. 9	7819	8225	1117.00	1174.96	405.70	1.932	2739.77	525	None	None	None	None	2967	None	None	2.90
Jan. 9-Feb. 8	8225	8862	1174.96	1266.00	637.30	3.035	4832.29	525	None	None	None	None	1494	None	None	5.60
Feb. 8-Mar. 10	8862	9454	1266.00	1350.57	592.00	2.819	4951.74	525	None	None	None	None	1407	None	None	4.80
Mar. 10-Apr. 9	9454	9730	1350.57	1390.02	276.11	1.315	5146.83	525	None	None	None	None	1236	None	None	4.01
Entire period	7819	9730	1117.00	1390.02	1911.11	2.275	17670.68	2100	None	None	None	None	7104	None	None	17.31
Lot VII—Ration: Shelled corn—cottonseed meal—timothy hay—oat straw—block salt.																
Dec. 10-Jan. 9.	7749	8208	1106.96	1172.61	459.60	2.189	2739.77	630	None	None	None	None	None	2233	148.00	1.70
Jan. 9-Feb. 8	8208	8665	1172.61	1237.86	456.70	2.175	4475.33	630	None	None	None	None	None	1007	23.00	2.50
Feb. 8-Mar. 10	8665	9148	1237.86	1306.90	483.30	2.301	4832.33	630	None	None	None	None	None	977	30.00	2.60
Mar. 10-Apr. 9	9148	9421	1306.90	1345.84	272.57	1.298	4712.53	630	None	None	None	None	None	787	62.18	3.01
Entire period	7749	9421	1106.96	1345.84	1672.17	1.991	16759.95	2520	None	None	None	None	None	5004	263.18	9.81

cattle fed on such roughages as timothy hay or corn fodder do not take on the necessary bloom and appearance to please the buyers' eyes then it is well to seek the remedy by using more of the leguminous hays such as clover and alfalfa with perhaps linseed oilmeal or cottonseed meal, particularly the last 60 days. Then too the silage-leguminous hay combination roughage with a high class protein supplement like linseed oilmeal to balance, if the silage production costs are not out of line, may well be considered.

Surely, in this cattle feeding business there are many problems in the selection, the purchasing, the feeding, the housing, the management, the shipping and the selling to challenge the mental strength and abilities of live-stock men.